

# Analyst Meet 2016

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## CORPORATE PARTICIPANTS

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Let me just introduce the next speaker. Given all that we have talked about for Mana and automation and so forth, the next session is dedicated for this. Tomorrow it will be four months since we launched Mana and it has seen quite a growth and interest in the client base in these last four months. I am very pleased that Sudhir is here, Sudhir Jha is the head of our product management and product strategy for the platforms business and especially Mana. Sudhir was at Google for 10 years before he came to us. He and I actually worked together in my startup long, long ago and then he went to Google, I went to SAP. Sudhir is a graduate of IIT Kanpur in Computer Science and has a Masters in Computer Science and an MBA and 10 years at Google, 8 years at Intel, 2 crazy years with me in between and so here he is. Sudhir..

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**Sudhir Jha**

So, I have to hold the fort. I am the last person standing and then you guys will be going out in the open world for kiosks and demos.

So, as Vishal said, I joined Infosys recently. In fact, today is exactly three months into Infosys, which is one quarter as we like to measure everything in quarters, thanks mostly to you guys. And as Vishal also mentioned, I was at Google before this, a little over 9 years, 37 quarters, to measure that way. And I was mostly involved in AI and machine learning projects there, a lot of them were in the fraud management policy enforcement on that side. And one of the reasons that I joined Infosys, besides I respect Vishal and as he said we worked together, is also to be part of this transformation. I think this a very important time in the industry as a whole, but Infosys as a company where we are trying to, sort of, redefine how the service industry will be playing out in the next few years. And to be part of that journey and excitement is a tremendous opportunity for me and hopefully for the company as well.

So, I will start with a few slides and I will get to demos for sure. I wanted to, sort of, give you a little bit of perspective of what Mana is and what our strategy behind that is, because that is very important for a company to do a platform when we have not done that for a long time, we need to have a very good strategy behind it and I will also talk about that. But before that, I am just going to paint some picture, unless you guys have been under a rock or something, everybody knows AI has sort of arrived and it has promise of changing the world. With any new advent of technology there is always hype and fear and AI has full of that. People talk about most of us would be out of jobs, but at the same time we do not have to brush teeth because robotics is going to do it for us. But if you would look at it, those are very contradictory because if all of a sudden I am unemployed robots also will be unemployed, because who is going to afford them. So, the idea is that there is lot of hype but what we have to realize is that there is going to be changes and it already has started happening in the consumer world quite a bit, but also in the enterprise world where AI is actually transforming the whole landscape of how businesses are done, how to add more value, how to be more productive, but also be very-very innovative. And companies have done that over time. If you look at the back bone of how this has happened, there are three layers of technologies that actually has transformed with the help of AI.

Data analytics, most of us have talked about that. It used to be not long ago, couple of decades ago that mostly it was done using rash data, some folks would sit in the room, work through all the data on a weekly or monthly basis, send some spreadsheet to management, people would sit in the board room, try to sort of peak through the data and figure out what it means to the business. And just in the last decade or so, the real time data analytics, that became a big thing like BI all that stuff. Where it is going and it already have started happening in the last couple of years is this predictive and prescriptive analytics and this all is because of the AI technology behind that.

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Automation similarly, when I learnt Computer Science it was mostly scripting and macros, right. Robotics and sort of UI based automation became quite hot in the last few years, we still sell lot of our licenses. So that is still, sort of, going on but really where we are going is more of this cognitive / mental or AI based automation where it is not deterministic, it is not a UI based thing, you are actually creating probabilistic models and figuring out how to automate that.

Knowledge Management, similarly went from versioning simple document control to where you can actually represent the knowledge into a model. And then you can go from there to infer that sort of model, reason with that, sort of integrate that. And all of this, sort of, is happening again because of some of the technology that is out there. And machine learning itself has also evolved over time. And the point of this is that each of these layers have evolved with AI and each of these layers significantly add value to the companies that are deploying it. And here are lots of competition, there are lots of vendors who just do one of these layers, so there will be data analytics companies, there will be knowledge management companies.

What Mana chose to do is actually to put this together into one integrated platform and we just did not do it because we wanted to beat the competition and put everything in one house, we did that because it actually made sense to put them together. And what happens when you put them together is that you can leverage these layers with each other and provide even greater value. So, for example, if you are able to predict that a machine is going to go down in five hours you can then use automation to fix that problem before that machine actually goes down and that whole thing now becomes a self-healing problem. So, instead of having to have the machine go down and then automate things and then fix this, you could do that because you could use data analytics to begin with the automation.

Similarly, Knowledge Management, if you can represent knowledge that is available in people's head, if you could grab a technician to write down all the knowledge that he has and codify it, you can then use automation technology to then take that code and automate that. And then every technician, even if he does not know how to fix a fridge is actually going to be able to do that because he will have that codification and we can actually give them at the right time at the right place.

So, all these sort of things when you start working together with these, it sort of gives you a higher level of innovation and value when you make them together and which is something that differentiates us quite a bit from other competition, because if you have just one layer you are not going to be able to do all these things I just talked about.

So, once you realize that, I want to show this picture just to give you an idea of what the platform in a logical data flow looks like. You have lots of data that enterprise already has, the issue is not of the data, the issue is what you do with it. And so what we do is we take that data, adjust into our system, we create knowledge based on that data and then we can do all sorts of things, you can automate things, you can gain insights. But we are going also then build solution on top of that, so that is the solution strategy that we have and I will talk in a minute about that.

But again, what we did for Mana was on purpose decided to build this as a platform which can be plug and play. So, you could bring any of the tools from outside and plug into this platform. Not only that, even in the internal platform you can bring in new machine learning algorithm, you can bring whatever you want and this is the fundamental difference again that Mana brings that some of our competition do not.

So, this was not to show you the architecture behind it but just to show you that this is actually a platform, when we talk about platform it is actually really a plug and play platform as opposed to a,

sort of, pre-build some solution that we have that we commonly use to increase productivity. And which is sort of the next slide's point, we want to take this to market with sort of these three different strategy: we want to sell this as a platform and Sandeep talked about how we have done that in some companies. We want to take this also of course with managed services where this is a part of the deal that we do with these clients. And again, the important thing here is that they actually get the full platform. So, we use a platform for our services but they can use the same platform for other services that they also have, but it actually gives us a very huge advantage not in terms of just cost saving for our portfolio but hopefully demonstrate value for other portfolio that they also have. But the third is actually the most important thing in my mind which open the door for these new pre-built solutions where we can actually innovate, things that Vishal talked earlier today where we have these new processes or processes that are not really doing the innovative things that they can actually do. So for example order to catch, most companies do not know how to predict the default rate on their clients because they do not have the right analytics, they do not have the right data and they do not have external sources. We can bring all these together into one solution and give them a pre-built solution and then customize it into their environment and they can actually be able to get all the value from that. And so this then brings us to a different layer and talk to a different set of people at the clients that we have. Similarly IoT and you will actually see the digital farming that is outside which is example of an IoT platform using Mana to then do data analytics on that. So, there are a lot of these solutions that we will pre-build and we will use these as innovative solutions that we will take to market.

So, hopefully that kind of gives you can idea of what we are trying to do, what Mana is and what we are trying to do with that. I will do a few demos and the idea of the demo is basically to show you three different personas and how we are improving their lives, some with insights, some with automation and trying to give them a much better picture of what their job is and how to do it more efficiently in all these cases.

So, I am actually doing something supposedly very brave, doing a live demo in front of large audience. We will see how it goes. So, the example that I have is basically a loan processing and this is a loan processing in a bank and given some of the numbers you can realize it is a small data sample from the bank that we are using. And the first person that I am going to show is of a business manager. So, the business manager typically worries about the process, is it efficient, how many things are stuck, where they are and those kind of things. And we are trying to, sort of, give these insights to this person. So, this actually shows you that there are about 66 loan application that is in the process of getting through in this bank but 15 of them are red and red is always bad right, so we do not want anything red. And the ideas is that these are pending loans that are most likely going to miss their SLA. So most, I do not know if you are familiar, but most loans have a close by date, so you have to close the loan in 45 days and if you do not then the lock-in rate that was locked for the loan is going to go away and then you basically have to start over. And so having these SLAs are very-very important and meeting them is also extremely crucial. So, one thing that you will realize is that not only we can predict loans that are currently going to miss the SLA but even something that is eight week out, we can say already that there is one loan there that already is going to miss the SLA. And again, these are not hard coded numbers, so mostly what happens today is a bank will have certain days for each process step and so if you do not get underwriting done in three days then you are basically going to miss the SLA. The problem is that not every loan is same right, so some loan will be more complex, some loan will be less complex. So these hard coded days actually are not really relevant, you need to understand the complexity of the loan, how long it is going to take for future steps to predict if it is actually going to miss the SLA or not. And so Mana with its data analytics capability is able to predict that and give you those beforehand so you can do something about that.

And what we can also do is that we can do process mining to understand the process steps even without the client telling us that, just looking at the data that we already have, looking at how the user is navigating through these applications we are able to predict that. And then we can in each

step tell you how many loans are stuck at which particular step and how many of them are going to get delayed. And again, this information is very critical because you know that there is two loan in the borrower verification that is going to miss SLA and so you can go and chase that and figure out before it actually misses SLA that you can do something about it.

The thing that actually I like a lot more is this graphics, which does not look like anything and I will show you what it does. So, the first line is telling you that there are 641 loans that we look through in our system and what we found is that there are 52 unique parts that these loans took. So, not every loan is same so we would have some unique parts, but nobody designs a system where you have 52 unique parts for processing alone. And when you deep dive into it, what you realize is that these sets of loans which is about 5.62% which looks pretty reasonable, there are about eight - nine steps, most of them are unique. So the color coding is showing you the steps and they are unique. But if you go into this set of loans, there are 13.3% loan where if you notice borrower verification step is happening four times, which is not something that anybody designed, you do not want to have four times borrower verification. And again, you can then go and look at and see why that is happening and there can be many reasons, one can be that your loan is not set up properly and the borrower is not giving all the information but you are still running through the whole step. Or you are changing the loan in the middle and therefore the verification happens again, there are lots of reasons that that can happen. And Mana gives you the ability to, sort of, deep dive into each of those loans and figure out why it happened and what happened.

Again, this is not automation, but this is very important because you can actually make the process simplified, much more simplified and do a lot more better processing of loan before you automate it.

### **Vishal Sikka**

So Sudhir, you should talk about the document we are injecting in this.

### **Sudhir Jha**

I will get to some of that, yes. So, the idea again is that automation is not the only solution, the problem is lot of our competition will, if they have an automation solution they want to automate everything, they will go and they will try to automate everything. But what you really want to do is actually do this holistic thing where you want to figure out what you want to eliminate first, figure out what you want to improve first before you actually start automating which is kind of what Mana is, because it integrated all these insights with automation, with knowledge management it is able to do all that together and give you those steps to get to a much faster improvement than a simple automation will give you that.

So, I will actually get to a different person where I will show some of the knowledge model stuff. So, the other persona that I wanted to show you about is the IT manager persona who basically has a completely different picture of the same process, he does not care as much about these different steps and where the loans are stuck, he really cares about the tickets and alerts and those things that are coming to him. And so he looks at that and he basically is able to, what the algorithm is able to do is actually cluster them together. So even though there might be 41 tickets they really fall into these four buckets and it is able to tell you which buckets are bigger and smaller and all that stuff. But it actually is able to do even more, again in insight side if you go you are able to see a chart that Sandeep showed you before, it is able to tell you that if you take all the tickets and you cluster them together, if you just take care of the first four, five problems you are able to get 80% - 90% of your improvement. Again, when you are doing automation you do not want to automate things that are actually going to be at tail end of your map, you want to do automation in the front side so that you can get maximum benefit with minimum effort. Which is

again an insight that a lot of our competition would not give you, they will try to automate whatever it is and bill a client for that.

But again, the chart that I like a lot is this correlation thing, right. So, what Mana is able to do is take different sources of data, in this case it is taking ticket data, alert data, error data and it is able to correlate those data together based on not just the time series but other healthy methods and things like that. And what it is able to tell you with those correlation is that there are certain types of alerts that are correlated more, so the darker the color the more the correlation. So, if you look at in the MaxDB connection you can see that there is a very high correlation of MaxDB connection to job failure, which is obvious if you look at it in that way. But it is not obvious necessarily when you are looking at these two alert systems separately. But again, the thing that is actually even more revealing is that when you go to an error type and alert correlation which is two different type of data sources and you are trying to correlate that, you are seeing that MaxDB connection also is very heavily correlated to the network issue. And there are two things there, one, the network issue was not an alert which actually is a mistake because you want to have that as an alert, this data we found because we have got the aero types and we have matched that. But it also then tells you that the network issue might be the reason that MaxDB connection is having an issue and therefore your job is failing. So, now you have a whole path, you can actually diagnose that, which is exactly what we do when we actually go to a task and if I do a root cause analysis I am able to have a diagnosis model.

So based on these correlation data we can actually create a diagnosis model with probability of these issues. So, it tells me that our performance issue can either be an infra issue or it can be an application issue. And it will actually have probability of both of these based on your past history. In infra issue it can either be a DB issue or an app server issue and then so on and so forth. And in each of these you can actually do a check to figure out if that is true or not, and then at the end you can automate the task. So, if you find out that it is an application issue which is a configuration issue then you can have an “update config” as a task that can be automated. So, again, this is the kind of automation that is not a simply deterministic automation, you are doing a cognitive automation, you are basically predicting what is going on and checking those things and then doing automation at the end. Which is, again, it is a higher level of automation that is possible because we can model these things and we can automate things underneath that.

So, I will quickly actually to go a third persona which is an engineer persona and this is very dear to us because most of us are engineers, but also because Infosys has a lot of engineers. And if you can actually automate lot of these things as well, we can get to what Ravi was talking about where we are not doing these, sort of, lower L1 automation or even actually getting, sort of, off-shore people released but getting the on-shore people released because we are doing higher level of automation. And so if you look at engineer’s dashboard you see a clear difference, there is no pretty looking chart because engineers do not like them, or at least we decided they do not like them. But it has these bugs and incidents, right. And so if you look at this bug besides telling you description of what the bug is, somebody has determined that there is a source code issue that this bug is related to. And in this case if you do a root-cause analysis instead of giving you that sort of IT automation chart, in this case it is tell you which files those bugs can potentially be. And of course, we would not know for sure which files it will be but we can give you a score. So, if you look at on that side it is giving you all these files where it thinks that the bug will most probably be and it gives you a score based on that. And so, you can start checking from the top and see where the bug is. So, we are not necessarily solving it completely, but we are solving it in a way that prioritizing and amplifying the task of the engineer.

But then what happens is that you find where the bug is and suppose in this case you find that those are the two files where the bug happens to be, you can then do an impact analysis which is completely automated. So, we already have run through and taken the source code and injected the source code, created the whole structure based on that and we know that if you have these

two files fixed this will impact these other two files that are related because the same function is being called from the other side, and so you have to also go and fix those two files. Which again, when we did a survey we found that 60% to 80% of time spent when they do bug fixes, they spend in impact analysis, root cause analysis and running tests. The bug itself takes very little time to fix.

And so, in this case now that you know that these two files also need to be fixed, then you can do which test cases to run and it actually gives you all the test cases that it thinks you need to run. So, these are the five test cases that you need to run for that. And again, all of this is automated because you have ingested the data, you have built data, you have developed data all that into the system and we have created this knowledge models which allows us to predict all these things and automate all these things.

So again, the idea is in this whole thing to show you and give you a very quick flavor that we are talking about automation at different levels than most of our competition is. We are talking about not just automation but fundamentally changing how different persona in companies work together and solve these problems in a very different way than they are today.

So, that kind of brings me to the end of the demo. Vishal, you want to make a comment?

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### Vishal Sikka

So, as you can see this is an endeavor, and the last part that Sudhir showed, the L3 engineers persona, our ADM organization has about 45,000 people in our ADM organization that do application maintenance and development. This is an application of Mana to an engineer who is doing maintenance of source code that was written by somebody else, a legacy source code. It is one thing to apply automation for L1 and L2 support where you are automating a run book and taking decisions, but it is another thing to assist an engineer who actually makes changes to source code and understanding that source code. So, in the case of loan for the business manager what Sudhir showed, was looking at loan documents and understanding their content. In the second scenario that he showed with the knowledge graph that was built, you are building a behavioral model and capturing the knowledge that is inside an organization and using that knowledge as the basis of reaching complex decisions. And in the final one, understanding among other things, source code because this is one of the most mentally taxing serious work that we do is analyzing and maintaining and making changes to source code. If you can amplify that engineer by taking out 50% - 60% of their work and replacing that with automation so that they can be more productive, this has a massive impact on our company and on our industry. In our ADM practice alone we have 45,000 engineers if you add verifications and package systems where we do more and more of this maintenance work. And one of our largest client, I interviewed some of our L3 engineers myself and it takes about 11 days to fix an L3 bug, 70% of the work that the engineers do is identifying where the bug is, doing the impact analysis and all of that which can be automated with Mana.

So, this is something that is at the heart of what we do. But beyond being at the heart of what we do and going after the most complex tasks, not the most basis ones but the most complex tasks, Mana can help to dramatically transform the work that our engineers do. But as Sudhir said earlier, we are also thinking about Mana not just as in bringing our managed services to improve productivity in a dramatic way, we are also thinking about this in completely new kind of applications that we were never able to do before, not in just the work that we do and here is a great example of that, Sudhir you want to talk about this?

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**Sudhir Jha**

No, thanks. Go ahead. It is very dear to you, so...

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**Vishal Sikka**

This is an example of a digital farm that we put together for one of our large agricultural client, a huge agricultural company. You can see that these are actually pods where small plants are growing, the entire thing is designed around, you can see in the back a big poster, this in our office in Palo Alto. The entire farm is digitally instrumented, these plants are growing.

What happened was that I was having a conversation with the CEO of this company and this is one of Sandeep's clients. And I asked him what his most important problem was and he said that it is not a big data problem that in our world if you see it goes through six stages in its life, the life of a plant, at every one of those stages they are able to identify what intervention needs to be brought to this seed, they just do not know that a particular plant in some corner of the world is in that state that if you could bring the right fertilizer, the right chemical, the right weed killer or whatever, the right amount of nutrition, the right amount of water, they could dramatically improve the productivity of that plant of the agricultural process, the yield of the agricultural process. I asked him how much was it and he said we can improve it by 30%, we can improve agricultural yield by 30% if we just knew that a plant was in that state.

So our team, none of these people who worked on this was a farmer, our team took on the task of figuring out how could you bring the power of artificial intelligence and the power of design thinking to solve this problem. And the answer is this: it is an ultra-affordable digital farm, all these equipment around it was all built by our team. You can see that the water, chemical, nutrients, cameras that are observing what is going on with the plants are all instrumented, the entire thing is controlled by Mana. And of course people can go in there and intervene, you can see the computer here and there is an image, which is actually an amplified image of two of these plants which are being observed by a camera. The whole farm digitally instrumented can be controlled remotely.

Why the 30%, significance of the 30%? The green revolution that happened in India was an improvement of 22% agriculturally that transformed our country. I remember I was 4 years old when the Bangladesh war happened and at that time there was a severe shortage of food, there was ship, I have this vague memory of my parents discussing the ship that was not allowed to come to the shore and it was carrying a lot of wheat and something like this. And within our lifetime, and some of you are too young to remember this, but within our lifetimes the agricultural yield has improved so much that India is not only self-sufficient in food, now we have Right to Food Act and we export, we are one of the largest exporters of wheat, we export milk now and this has all happened in my lifetime. And then we think about the idea of software amplifying people, it is similar to the Green Revolution, this is what I refer to as the human revolution that if we could amplify. This kind of technology actually improves actually improves the yield of this plant as much as the Green Revolution did. If you could do the same kind of a thing to people with software I think we would have a different kind of revolution on our hand.

So, hopefully you got a good sense of what we are trying to do with Mana and there is more outside for you to take a look at.

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## **Management**

There is actually a video on this as well outside, so please do to check it out. And we will be outside if you have any questions.

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## **Vishal Sikka**

Thank you very much.